UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

UNITED STATES OF AMERICA - v. - KALEIL ISAZA TUZMAN and OMAR AMANAT, Defendants.	S8 15 Cr. 536 (PGG)

DEFENDANT KALEIL ISAZA TUZMAN'S TRIAL BRIEF REGARDING THE ADMISSIBILITY OF EXPERT TESTIMONY OF DR. ALBERT H. LYTER III

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Rules

Pursuant to the Court's oral order of November 20, 2017, Defendant Kaleil Isaza Tuzman, through undersigned counsel, respectfully submits this trial brief regarding the admissibility of expert testimony on ink analysis proffered by Dr. Albert H. Lyter III.

PRELIMINARY STATEMENT

Robin Smyth—KIT Digital's former Chief Financial Officer—is the backbone of the government's conspiracy allegations in Count Six against Mr. Isaza Tuzman. To prop up Smyth's credibility, the government offered and the Court admitted—over Mr. Isaza Tuzman's objection—several pages from Smyth's notebooks that purportedly reflect contemporaneous notes of his activities in 2008-2012 in furtherance of the alleged conspiracy with Mr. Isaza Tuzman. But, as Dr. Lyter's forensic ink-dating analysis reveals, at least eight pages in these notebooks have been doctored with new handwritten entries having been placed in them within the two years prior to Dr. Lyter's examination (and long after any alleged scheme with Mr. Isaza Tuzman had ended). The pages so altered include two of the pages that the government has expressly relied on in its case-in-chief (GX 2188-B and GX 2188-C).

The government has sought to quash Dr. Lyter's testimony at every turn. As the *Daubert* hearing confirmed, however, Dr. Lyter is eminently qualified as an ink analyst including in the use of Gas Chromatography/Mass Spectrometry ("GC/MS") to analyze ink and, as the government's own rebuttal expert conceded, the Solvent Loss Ratio methodology of ink-dating employed by Dr. Lyter here is reliable and generally accepted in the field. The government has thus recast its objection as a challenge to the quality controls Dr. Lyter utilized to ensure that his ink-dating methodology was reliable and his test results free of contamination. The bulk of the hearing centered on issues of quality checks, controls testing using blanks, and deviations from a written methodology. The government's objections are misplaced and irrelevant for purposes of

admissibility: Not only were the quality-control measures Dr. Lyter took more than sufficient under the circumstances—as demonstrated through Dr. Lyter's testimony and further corroborated by an affidavit from the Director of the university laboratory where Dr. Lyter conducts his ink-dating analysis—but none of the speculation regarding potential contamination has any basis in fact or science as demonstrated below. In any event, purported issues of quality control and deviation from settled methodology do not constitute grounds to preclude expert testimony. Such topics of inquiry are properly reserved for cross-examination before the jury. Dr. Lyter's testimony is thus admissible under *Daubert* and critically important to give the jury a full picture regarding the lengths to which Mr. Smyth has gone to fabricate evidence that supposedly implicates Mr. Isaza Tuzman in fraud.

BACKGROUND

A. Mr. Isaza Tuzman Informs The Government That Dr. Lyter Performed Ink Analysis Between February And April 2017

On May 20, 2016, in a production from the Securities and Exchange Commission, Mr. Isaza Tuzman received copies of notebooks purportedly authored by Mr. Smyth. *See* Ex. A (KIT Ex. 10009, at 1). Mr. Isaza Tuzman informed the government that these notebooks were potentially critical pieces of evidence that may contain both exculpatory and impeachment evidence. *See id.* Accordingly, on June 21, 2016, Mr. Isaza Tuzman pointedly requested that the government perform ink analysis on the Smyth notebooks to verify their authenticity. *See id.* at 2. Mr. Isaza Tuzman requested both ink-dating analysis and ink-identification analysis. *See id.* Mr. Isaza Tuzman asked that the analysis be performed immediately, citing the dangers of delaying tests due to the natural aging process of the ink. *Id.* ("Given that the efficacy of the tests described above diminishes literally with each day that passes, we request that this analysis be conducted immediately to ensure and impeachment evidence is preserved."). Despite Mr.

Isaza Tuzman's request, the government chose not to perform ink analysis at the time, nor at any other time in this matter—instead allowing the evidence to become irreparably stale over time.[1] Thus, by virtue of its own inaction, the government can no longer retain an expert to perform an ink analysis that would result in an apples-to-apples comparison with Dr. Lyter's conclusions about the age of the ink. *See* Ex. B (Tr. 3014:13–3015:9).

As the same time, in June 2016, Mr. Isaza Tuzman informed the government that he would be performing an independent forensic examination of the notebooks regardless of whether the government did so. *See* Ex. A (KIT Ex. 10009, at 2). Mr. Isaza Tuzman ultimately retained Dr. Lyter to perform ink analysis on the Smyth notebooks. *See* KIT Ex. 10004. On February 23 and 24, 2017, Dr. Lyter conducted a physical examination of the five original notebooks at the offices of the United States Postal Inspection Service, located at 90 Church Street, New York, NY, 10007. *See id.* at 2. The examination was performed under the observation of Postal Inspector Melissa Atkin. Dr. Lyter testified that he did not detect anything unusual about the conditions of the notebooks during his examinations that would lead him to believe that the notebooks had been exposed to a harsh environment or one that would affect the natural aging process of ink. *See* Ex. B (Tr. 2818:14–19). During these examinations, Dr. Lyter used a hypodermic Harris needle to remove multiple 0.5mm samples from the notebooks for further chemical examination using the Thin-Layer Chromatography ("TLC") method and GC/MS method. *See* KIT Ex. 10003, at 4–5; KIT Ex. 10004, at 4–7. Dr. Lyter carried these samples with him to North Carolina for chemical examination. *See* KIT Ex. 10004, at 2–3. Dr. Lyter performed TLC analyses on March 3, 2017, and GC/MS analyses on March 10, April 12,

[1] On July 24, 2017, the government informed Mr. Isaza Tuzman that it would not be calling an ink expert during its case-in-chief. *See* KIT Ex. 10000, at 34.

and April 13, 2017. *See* Ex. B (Tr. 2814:2–2815:5). Dr. Lyter kept notes of his testing, and ultimately compiled a written report, dated November 16, 2017, that streamlined all of his previously disclosed data and results into one document. *See* KIT Ex. 10004.

B. Mr. Isaza Tuzman Provides the Government with a Detailed Disclosure of Dr. Lyter's Results and Conclusions in August 2017, Pursuant to Federal Rule of Criminal Procedure 16

On August 21, 2017, Mr. Isaza Tuzman disclosed to the government a summary of Dr. Lyter's conclusions and anticipated testimony. *See* KIT Ex. 10002, at 2–4. In this summary disclosure, Mr. Isaza Tuzman's counsel informed the government that Dr. Lyter (1) performed a physical inspection of the notebooks using the unaided eye, handheld magnifiers, video-based magnification, and a digital microscope, (2) performed a chemical analysis using the TLC method, and (3) performed a chemical analysis using the GC/MS method. *See* KIT Ex. 10003, at 4–5. Counsel further disclosed to the government, in a meet-and-confer call on August 30, 2017, the basis in the scientific literature for the Solvent Loss Ratio methodology Dr. Lyter used, and provided a copy of a well-regarded scientific presentation describing the methodology on September 2, 2017. KIT Ex. 10000, at 1.

In addition, the summary disclosure informed the government of the key conclusions reached by Dr. Lyter after his analysis: namely, (1) the writings in the notebooks were prepared with at least 11 different ink formulations, (2) the 11 ink formulations were similar to ink formulations available at the purported dates of authorship of the notebooks (although no conclusion can be drawn as to the documents' authenticity based on that fact alone), and (3) eight[2] different written entries within the notebooks (identified at the time for the government by

[2] As Dr. Lyter testified during the hearing, after performing mathematical re-calculations ahead of his testimony as is his practice, he identified one mathematical error in his calculations. He inadvertently left a zero out of one value for the Internal Standard. This mathematical error

Bates numbers) were inconsistent with the preparation of the entries during the purported time period they are represented to have been prepared (*i.e.*, from the years 2008 through 2012). *See* KIT Ex. 1003, at 6.

C. In Response to the Government's Claims of Inadequate Expert Disclosure, Mr. Isaza Tuzman Provides Additional Data and Results In September, October, and November 2017

Despite the August 21, 2017 disclosure, the government continued to demand additional information from Dr. Lyter. *See* KIT Ex. 10000. Dr. Lyter complied with each of these additional *ad hoc* requests as feasible. *See* KIT Ex. 10000.

On September 5, 2017, Mr. Isaza Tuzman produced to the government the GC/MS results for each of the nine notebook pages Dr. Lyter had initially concluded to contain ink entries less than two years old, along with a copy of the page. *See* KIT Ex. 10000, at 33– 76. This production included the chromatogram, mass spectral graph, and Internal Standard ("IS") value for each heated and unheated sample from each page. *See id.*

On October 25, 2017, Mr. Isaza Tuzman produced the GC/MS data for the 12 notebook pages that Dr. Lyter was not relying on in his proposed testimony. KIT Ex. 10000, at 77–123. This data included a copy of the notebook page, the chromatogram, mass spectral graph, and IS values for the heated and unheated samples. KIT Ex. 10000, at 77–123. In addition, Mr. Isaza Tuzman produced Dr. Lyter's handwritten notes performing the R% value calculations for the notebook pages. KIT Ex. 10000, at 125–27. The production also included pictures of the TLC plates. KIT Ex. 10000, at 205–13.

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brought the R% value for that entry—a measure for the relative age of the writing—below the relevant threshold of 35% he used for identifying writing authored within the two years prior to testing. As such, the total number of notebook pages reported in the initial disclosure was nine, but is now eight. Ex. B (Tr. 3019:14–3020:7).

On November 1, 2017, Mr. Isaza Tuzman, in an effort "to be as responsive as possible," made yet another production at the government's request. KIT Ex. 10000, at 215. Mr. Isaza Tuzman directed Dr. Lyter to "generate anew a computer printout reflecting the testing conditions under which GC/MS analysis is performed" by the GC/MS instrument utilized by Dr. Lyter. KIT Ex. 10000, at 215. The production included these printouts. KIT Ex. 10000, at 218–222.

On November 3, 2017, Mr. Isaza Tuzman made yet another reproduction of data stored on the GC/MS instrument, at the government's request. KIT Ex. 10000, at 223. This production included the data on the areas beneath the peaks (the "peak areas") of the chromatograms for the heated and unheated samples. KIT Ex. 10000, at 228–313.

The government continued to request additional data—including data already in its possession—and Mr. Isaza Tuzman, in an effort to be responsive, continued to comply with all feasible requests by either asking Dr. Lyter to regenerate materials or identifying for the government the previous production in which the information it sought was already located. *See* KIT Ex. 10000, at 313–14. On November 10, 2017, Mr. Isaza Tuzman produced the Autotune data for the GC/MS machine for the dates of Dr. Lyter's March 10 and April 12 tests (a calibration run confirming the instrument is operating within normal parameters), a table identifying the dates of testing, and a re-production of the October 25, 2017 production (which included the data that government was re-requesting). *See* KIT Ex. 10000, at 320–23.

On November 16, 2017, Mr. Isaza Tuzman, after consultation with Dr. Lyter concerning confidentiality concerns, also produced to the government three reports prepared by Dr. Lyter in civil cases in which he performed GC/MS ink-dating analysis. KIT Ex. 10000, at 352–61.

D. In November 2017, the Government Proffers Rebuttal Expert Testimony Attacking the Reliability of Dr. Lyter's Results Because of Certain Alleged Deficiencies in Quality Controls

On November 7, 2017, nearly 18 months after Mr. Isaza Tuzman asked the government to perform ink analysis on the Smyth notebooks, and over two months after Mr. Isaza Tuzman disclosed Dr. Lyter's summary of anticipated testimony, the government provided Mr. Isaza Tuzman with notice of a rebuttal expert in the form of a declaration, dated October 2, 2017, of Mr. Gerald LaPorte. This was the same declaration, submitted without any alteration, as had been attached to a court filing in October. *See* KIT Ex. 10005. Notably, Mr. LaPorte did not, himself, perform any ink-dating analysis related to the Smyth notebooks—either physical or chemical. In fact, even if he had done so, Mr. LaPorte conceded that any ink-dating analysis would not be an apples-to-apples comparison with Dr. Lyter's analysis due to the lapse of time and continued aging process of the ink. *See* Ex. B (Tr. 3014:13–3015:9). Instead, Mr. LaPorte attacked only the reliability of Dr. Lyter's actual testing based on a host of alleged deficiencies in quality controls (in the opinion of Mr. LaPorte). *See* KIT Ex. 10005.

E. At the *Daubert* Hearing, Dr. Lyter Explains His Methodology, With Detailed References To All Produced Data, And Refutes Criticisms Of His Testing

On November 20, 2017, the Court held a *Daubert* hearing during which Dr. Lyter explained the methodology of GC/MS ink-dating analysis, his testing regimen, his conclusions, and the sources of data he relied upon to reach those conclusions to a reasonable degree of scientific certainty.

As Dr. Lyter explained, it is now generally accepted in the field of forensic document examination that "there are processes ink undergoes when it is applied to paper from pen," which allow for the relative dating of ink entries within a certain range of years. Ex. B (Tr. 2798:23–24). "[O]nce [the ink is] exposed and placed onto a document, then it starts to undergo

numerous changes." Ex. B (Tr. 2799:1–2). GC/MS testing "identif[ies] and quantitate[s] the amount of semi-volatiles that are present" in the ink. Ex. B (Tr. 2844:10–17). Semi-volatiles are substances that "volatilize or [] evaporate" due to environmental exposure. *See* Ex. B (Tr. 2802:11–25). The relevant semi-volatile compound for ink dating analysis is 2-phenoxyethanol ("PE"). Ex. B (Tr. 2844:18–25). Measuring changes in the PE level after ink samples have been artificially aged (by heating) and compared to unheated ink samples from the same writing permits one to determine the relative newness of the ink, as numerous researchers in the field have validated—including Marc Gaudreau and Luc Brazeau, who published an extensive seminal research paper on the subject in 2002. Ex. B (Tr. 2844:18–25). Once it has been determined, using the GC/MS technique, that PE is present in an ink sample, the peak height or peak area of the mass spectrometry can be used to calculate the R% (representing the magnitude of the change in the PE level in the ink attributable to artificial aging). Ex. B (Tr. 2845:1–7). The mass spectrum graph allows one to confirm the presence of PE because it creates a signature graphical representation of the ion peaks that are characteristic of PE. Ex. B (Tr. 2844:18–25). The R%, as Gaudreau and Brazaeu reported in 2002, is the Solvent Loss Ratio of PE that is calculated as a percentage. *See* Ex. B (Tr. 2845:1–7). The underlying premise of this calculation is that if there is not much PE present in the ink then there will be little change between the heated and unheated samples which means that the writing is not recent. Conversely, if there is a lot of PE present, the heated sample will burn off the PE which means that the writing may be recent. *See* Ex. B (Tr. 2845:8–19). Thus, if the R% is high (35% or more based on recent literature, but 25% or more based on earlier research), then the writing was authored within 2 years of the date of testing. *See* Ex. B (Tr. 2845:20–2846:3). If the R% is low (below 35%, or

25% as the case may be), no conclusion can be drawn about the date of authorship, but one cannot say specifically that it was done within the 2 years prior to testing. *See id.*

During the *Daubert* hearing, Dr. Lyter detailed the steps he took to calculate the R% using the Solvent Loss Ratio method. In brief, for GC/MS ink analysis testing, Dr. Lyter used pairs of samples that were separate from the samples he used for TLC testing. Ex. B (Tr. 2847:15–21). Notably, each GC/MS test is an independent test. Ex. B (Tr. 2868:18–2869:1) ("Q: Let me ask you this. Is each GC/MS run, each test on the sample independent of any other test? A: Yes; Q: So one run does not influence the other run at all, right?; A: That's correct.; Q: Each test can stand alone as long as the instrument is working correctly and isn't contaminated? Would that be fair to say? A: That's right."). Two samples were taken close in proximity from the notebook pages. Ex. B (Tr. 2847:22–2848:17). The proximity of the hole punches in sample pairs is an internal control mechanism to control for the amount of ink in each sample. Ex. B (Tr. 2848:13–17) (Q: Is it fair to say that the proximity of the samples to each other is sort of an internal control mechanism to control for the amount of ink in the sample? A: It's the methodology that is in the literature as to how to best take samples from the particular document in question."). Four samples from each tested handwritten entry (one from each pair) were placed in a vial to be heated, and the other four samples (the others of each pair) were in a vial that was not heated. Ex. B (Tr. 2849:15–2850:13). The heated samples were heated for two hours at 70 degrees centigrade. *Id.* Following that, a solution of acetonitrile was added to both vials to extract chemicals from the ink and paper. Ex. B (Tr. 2850:18–2851:18). The solution included a known concentration of a chemical called cresol, which acted as an internal standard—that is, a benchmark value by which to quantify the concentration of detected PE. *See id.* The contents of each vial were then separately injected into the GC/MS instrument (after the

GC/MS machine had run its Autotune process). Ex. B (Tr. 2852:19–24). The resulting graphs produced by the computer, as discussed above, are utilized to calculate the R%. Ex. B (Tr. 2856:17–2857:9).

After completing his GC/MS analysis, Dr. Lyter concluded as follows: "I found eight different entries that the amount of phenoxyethanol or PE and the solvent loss ratio of those writings was not consistent with writing done during the time period that the documents purportedly were prepared and that the analysis results indicated the writing was done sometime within the last two years or by the years from the date of the examinations which were in March and April of 2017." Ex. B (Tr. 2814:5–11); *see also* KIT Ex. 10004, at 7.

F. Mr. LaPorte, Having Conducted No Testing of the Notebooks Himself, Testifies in Rebuttal that Dr. Lyter's Methodology Was Faulty

Although Mr. LaPorte did not conduct any actual ink-dating analysis, he testified during the *Daubert* hearing on areas of alleged concern regarding Dr. Lyter's analysis. Mr. LaPorte identified what he claimed to be four areas of concern: (1) the quality control standards, (2) Dr. Lyter's alleged reliance on only one academic article, (3) Dr. Lyter's use of peak height in his calculations (versus peak area), and (4) the alleged poor chromatography. *See* Ex. B (Tr. 2978:10–2996:14).

With respect to quality control, Mr. LaPorte criticized Dr. Lyter's decision not to test paper blanks or solvent blanks—pieces of the notebook paper that had no ink on them and tests of the pure solvent before it was mixed with ink samples. *See* Ex. B (Tr. 2978:10–2980:19). With respect to paper blanks, Dr. Lyter testified on his direct examination and cross-examination that paper-blank testing was not necessary when performing multiple tests on the same ink and the same paper, as was the case here. *See* Ex. B (Tr. 2882:18–2884:8). That is to say, multiple tests of the same ink allowed Dr. Lyter to determine whether any samples exhibited dramatically

higher PE levels, which would alert him to possibility that there was contamination from an external source. *See id.* As explained *infra* pp. 36-38, Dr. Lyter's results confirmed that there was no contamination of the notebook paper. Ex. B (Tr. 2883:24–2884:3) ("Q: Then you also said, which was the second part, that the internal results themselves confirm that there was no contamination because you had so many GC/MS runs; isn't that right? A: Yes. That's right."); Ex. B (Tr. 3021:1–6) ("A: And number two, because we've done testing that involved the same ink formulation on different pages, the value of PE that was in that particular ink formula was consistent among the samples that we measured. Therefore, it would not be consistent with there being any kind of contamination or additional PE that was present for some reasons.").

Furthermore, Dr. Lyter testified that the high temperature to which the GC/MS instrument is permitted to rise in a complete sample run "would eliminate [contamination] and it would certainly remove it from the area of the chromatogram that's associated with the measurements that are important which is the internal standard and the phenoxyethanol." Ex. B (Tr. 3022:24–3023:2). With respect to solvent blanks, Mr. LaPorte simply ignored Dr. Lyter's earlier testimony on cross-examination that he had, in fact, already previously tested the vial of the very same acetonitrile (the solvent) that he used for testing. Ex. B (Tr. 2937:20–2938:1) ("Q: But you did not run a solvent blank to determine whether there was any PE in the solvent? A: Not before I did this testing. I had done samples of that type before with acetonitrile that came from the same bottle so I knew that there was no PE in it.; Q: The exact same bottle used in this case? A: Yes.").

Within the context of quality control, the government also criticized Dr. Lyter with regard to his assumptions concerning the conditions under which the notebooks were kept. *See* Ex. B (Tr. 2972:3–2973:20). Dr. Lyter testified that he understood the notebooks had been

"stored in a manner that most people store documents," including a file cabinet or box. Ex. B (Tr. 2817:11–22). He further testified that he saw no evidence that the notebooks had been exposed to a harsh environment. Ex. B (Tr. 2818:14–19). During direct examination, Dr. Lyter testified as to an engagement for the company Facebook, during which both he and Mr. LaPorte were engaged to analyze a document, and where "storage conditions were extremely harsh … and yet there was GC/MS analysis" performed by Mr. LaPorte in that case. *See* Ex. B (Tr. 2887:14-2888:5). Indeed, a review of Mr. LaPorte's deposition testimony in the Facebook engagement indicates that his analysis was (unfairly) criticized for not taking storage conditions into account, and in response he explained that the solvent loss ratio benchmark of 25% (which Dr. Lyter raised to 35% based on his opinion with respect to changes in the academic literature) already accounts for variations in storage. *See Ceglia*, 2013 WL 1208558, at 26. The Western District of New York appropriately discussed such criticisms as not affecting the reliability of the Solvent Loss Ratio methodology. *Id.*

With respect to academic literature, Mr. LaPorte criticized Dr. Lyter's alleged reliance on only one academic article. Ex. B (Tr. 2982:19–20). Mr. LaPorte seemingly ignored Dr. Lyter's earlier testimony that he relied on a broad range of literature in the field generally, as it is updated and develops over time. *See* Ex. B (Tr. 2846:22–24) ("Q: Is this the article you were referencing, Dr. Lyter, that you relied on in developing your methodology? A: Yes, that's one of them."); Ex. B (Tr. 2872:14–19) ("Q: And do you recall any articles in which you've seen mention of a negative R percent as being possible?; A: There's an article where the author's name is Weyermann. She's a professor in Switzerland. And she mentions the fact that these

negative values continue to be present in some of the data she was reporting on.")[3]; Ex. B (Tr. 2897:25–2898:4) ("Q: And you've testified that the methodology you followed in this case was based on Gaudreau and Brazeau paper. Is that correct? A: This paper as well as a paper that was done by Gaudreau in conjunction with Aginsky."). In fact, Dr. Lyter testified during his direct and cross-examinations that he relied on two articles for the general basis of his methodology, and a broader spectrum of academic literature that informs his work in the field. *See* Ex. B (Tr. 2846:22–24; 2872:14–19; 2897:25–2898:4). Mr. LaPorte conceded that he had previously characterized the Gaudreau article relied upon by Dr. Lyter as "an extensive research effort that focuses on how PE levels change over time following an ink entry placed on paper." Ex. B (Tr. 3010:13–16).

With respect to Dr. Lyter's use of the peak height for calculations (versus the peak area), Mr. LaPorte attempted to throw these calculations into doubt by performing his own calculations based on peak area. *See* Ex. B (Tr. 2988:8–15). Even assuming, *arguendo*, that there is validity to Mr. LaPorte's argument that peak area provides a more accurate measure, his calculations still resulted in 5 samples with R% above 35% (and thus authored within the two years prior to testing). Ex. B (Tr. 2999:10–14) ("Q: Thanks. That's helpful, Mr. LaPorte, but I asked you based on the calculation using the peak area did the R percent value remain above 35 percent for five of these eight samples, yes or no? A: Yes."). Further, Dr. Lyter testified that the use of peak height for ions in a mass spectrum to obtain concentrations of analytes is an accepted method within the field of analytic chemistry. Ex. B (Tr. 3036:4–11) ("Q: Is it generally accepted in the

[3] Notably, one of Mr. LaPorte's criticisms concerned the negative numbers obtained by Dr. Lyter in the R% calculation. As identified in this Weyermann piece cited by Dr. Lyter during his testimony, negative R% is not uncommon and does not reflect deficiencies in quality control or methodology in performing the Solvent Loss Ratio analysis. *See* Ex. B (Tr. 2872:14–19); *infra* pp. 47-48.

field of forensic document examination to use the peak height as an alternative measure of abundance? A: It's certainly an accepted method within the field of analytic chemistry. There's not that many instances in which questioned document examination would involve that kind of judgment, but both measurements are appropriate. They each have their issues."). *See infra* sec. IV.A. Dr. Lyter explained that there were also issues with using the peak area, particularly with respect to choosing the baseline for the area to be calculated. As Dr. Lyter testified, the data so obtained "will vary depending upon how you assign the baseline." Ex. B (Tr. 3038:19–20).

Finally, Mr. LaPorte criticized Dr. Lyter's results by opining expansively that "everything" was wrong with the chromatograms Dr. Lyter had obtained. *See* Ex. B (Tr. 3004:23–5). When questioned on cross-examination about his testimony regarding wide peaks in Dr. Lyter's chromatograms, Mr. LaPorte could not point to any evidence of impermissibly wide peaks and, with regard to the GC/MS chromatogram actually before him, shrugged that defense counsel had only shown the Court the "best" graph Dr. Lyter had produced. *See* Ex. B (Tr. 3002:21–3003:1). When presented with a comparison to his past work that revealed largely indistinguishable peak shapes between Dr. Lyter's results and his own, Mr. LaPorte described his own prior chromatography as "great" without actually explaining why it was different in any material way from the chromatogram for PE that Dr. Lyter had obtained. *See* Ex. B (Tr. 3005:19–3006:4) ("Q: I thought your testimony was that contamination wouldn't just affect PE, it would affect everything in the ink; isn't that right? A: No. Not necessarily—I never said that.; Q: Really? So contamination is attracted only to PE? A: No. Contamination – there's different types of contamination. There could be – but if there is phenoxyethanol contamination, then you would see that. But I ran a solvent blank in this particular case and I run a – and I actually ran the paper blank and showed that there was no 2-phenoxyethanol."). Although Mr. LaPorte

criticized "noise" in Dr. Lyter's chromatograms, Dr. Lyter candidly explained that noise *can* be problematic in test results, but *only if* it is at a level three times greater than the signal being analyzed (the "signal-noise ratio")—which phenomenon did not appear in any of his test results. *See* Ex. B (Tr. 3039:12–23).

Importantly, at the conclusion of the *Daubert* hearing, Dr. Lyter reaffirmed his conclusion that, to a reasonable degree of scientific certainty, eight of the sampled ink entries were put to paper within the two years prior to his March and April 2017 testing. *See* Ex. B (Tr. 3041:21–3042:1).

ARGUMENT

I. The *Daubert* Standard Is Flexible and Challenges Premised on Quality-Control Procedures Go To the Weight, Not Admissibility, of Expert Testimony.

Under Federal Rule of Evidence 702, the Court may admit "[a] witness who is qualified as an expert . . . if: a) the expert's scientific . . . knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; b) the testimony is based on sufficient facts or data; c) the testimony is the product of reliable principles and methods; and d) the expert has reliably applied the principles and methods to the facts of the case." Fed. R. Evid. 702. In *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993), the Supreme Court set out a list of non-exclusive factors that the trial court may consider in determining whether an expert's reasoning or methodology is reliable: (1) whether the theory or technique used by the expert can be, and has been, tested; (2) whether the theory or technique has been subjected to peer review or publication; (3) the known or potential rate of error of the method used; (4) whether there are standards controlling the technique's operation; and (5) whether the theory or method has been generally accepted within the relevant scientific community. *Daubert*, 509 U.S. at 593-94.

The *Daubert* inquiry "is fluid and will necessarily vary from case to case." *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 266 (2d Cir. 2002). This liberal standard of admissibility contrasts with the "bright-line 'general acceptance' test" that governed under *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), and its progeny, which the Federal Rules of Evidence supplanted. *Amorgianos*, 303 F.3d at 266 (citing *Daubert*). As the Advisory Committee explained in the context of the December 1, 2000 amendment to Rule 702, "the trial court's role as gatekeeper is not intended to serve as a replacement for the adversary system." Fed. R. Evid. 702 advisory committee's note (citation omitted). Indeed, Rule 702's limitations on expert testimony "accords with the liberal admissibility standard of the federal rules" and recognizes that our adversary system provides the necessary tools for challenging reliable, albeit debatable, expert testimony [:] . . . '[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof.'" *Amorgianos*, 303 F.3d at 267 (quoting *Daubert*, 509 U.S. at 596). "[W]hen all experts are qualified," Rule 702 does not allow "a district court [to] make winners and losers through its choice of which side's experts to admit." *United States v. Mitchell*, 365 F.3d 215, 245 (3d Cir. 2004). At bottom, the *Daubert* analysis is intended to give the district court the discretion "needed to ensure the courtroom door remains closed to junk science," while admitting reliable expert testimony that will assist the trier of fact. *Amorgianos*, 303 F.3d at 267. In other words, "'the rejection of expert testimony is the exception rather than the rule.'" *United States v. Morgan*, 53 F. Supp. 3d 732, 740 (S.D.N.Y. 2014) (quoting Fed. R. Evid. 702 advisory committee notes).

In recognition of this liberal admissibility standard, courts view issues related to quality control and alleged (but unproven) laboratory error as going to the weight of the testimony, not to its admissibility. In tandem, the Second Circuit has emphasized that "a slight modification of

an otherwise reliable method will not render an expert's opinion *per se* inadmissible. The judge should only exclude the evidence if the flaw is large enough that the expert lacks 'good grounds' for his or her conclusions." *Amorgianos*, 303 F.3d at 267. In this way, the courts have distinguished between the reliability of the methodology itself, and the manner in which that method was applied: "A claim that scientific methods are unsound must be addressed initially by the trial judge, while a claim that scientifically sound methods have been applied improperly ordinarily should be left for the jury to resolve unless the alleged 'error negates the basis for the reliability of the principle itself.'" *United States v. Shea*, 957 F. Supp. 331, 337 (D.N.H. 2004) (quoting *United States v. Martinez,* 3 F.3d 1191, 1198 (8th Cir. 1993)); *see also United States v. Chischilly*, 30 F.3d 1144, 1154 (9th Cir. 1994), *overruled on other grounds by United States v. Preston*, 751 F.3d 1008 (9th Cir. 2014) (en banc) ("Chischilly failed to demonstrate that the degradation is the result of a faulty methodology or theory as opposed to imperfect execution of laboratory techniques whose theoretical foundation is sufficiently accepted in the scientific community to pass muster under *Daubert.*"); *City of Pomona v. SQM N. Am. Corp.*, 750 F.3d 1036, 1047 (9th Cir. 2014) ("[A]dherence to protocol [is] typically is an issue for the jury."). Indeed, in *City of Pomona*, the Ninth Circuit found reversible error when the district court rejected the plaintiff's proposed expert because, among other things, his methodology deviated somewhat from the relevant protocol and he failed to have his results independently verified. 750 F.3d at 1047. According to the court of appeals, such concerns "may serve to undermine or impeach the weight that should be afforded to [the expert's] testimony, but it does not refute the scientific reliability of his analysis." *Id.*

This circuit's liberal standard for admissibility of expert testimony applies with equal force in criminal cases. For example, in *United States v. Morgan*, the defendant challenged the

government's DNA expert testimony because, among other things, the government's expert relied exclusively on DNA swab samples that were "pristine," as opposed to so-called "crime-stain mixtures" called for in the relevant guidance. 53 F. Supp. 3d at 743-44. The district court rejected this argument and admitted the expert testimony, explaining that "[t]his argument is certainly one that the defense can introduce at trial to rebut the Government's evidence." *Id.* at 744. In other words, "additional validation studies using crime-stain … samples might have bolstered the strength of [the expert's] conclusions, but are not prerequisites to a finding of reliability sufficient to satisfy the *Daubert* test." *Id.* The Second Circuit affirmed this ruling on appeal, notwithstanding the court's tepid endorsement of this particular methodology as having "significantly weaker evidence of reliability than traditional DNA analysis." *United States v. Morgan*, 675 F. App'x 53, 56 (2d Cir. 2017).

The Sixth Circuit similarly affirmed the admissibility of expert testimony notwithstanding serious concerns in *United States v. Bonds*, 12 F.3d 540 (6th Cir. 1993). There, the government introduced expert DNA evidence that contained "serious deficiencies" in the FBI's proficiency tests and evidence that the FBI failed to conduct external blind proficiency tests, which the "scientific community considers indispensable." *Id.* at 560. But the court of appeals affirmed in light of the district court's findings that the technique in question was generally accepted, "the criticisms about the specific application of the procedure used or questions about the accuracy of the test results do not render the scientific theory and methodology invalid or destroy their general acceptance. These questions go to the weight of the evidence, not the admissibility." *Id.* at 563.

Indeed, courts in criminal trials admit expert testimony even where the standards themselves are *subjective*. For example, in *United States v. Ashburn*, 88 F. Supp. 3d 239

(E.D.N.Y. 2015), the district court admitted the government's so-called "toolmark identification" expert testimony—a theory of ballistics evidence that every weapon leaves unique marks on an exiting projectile—which requires the expert to assess whether there is "sufficient agreement" between the crime-scene sample and the firearm in question. *Id.* at 243. In response to the defendant's objection that this test was unreliable because of its subjectivity—each expert has his own view of whether agreement is "sufficient"—the court explained that "subjectivity of a methodology is not fatal under Rule 702 and *Daubert*." *Id.* at 247. Instead, the court allowed the testimony along with the limitation that, in light of the methodology's subjectivity, the expert could not testify that he was 100% certain of the match, or some similar level of confidence. *Id.* at 248-49.

This authority makes clear that absent exceptional circumstances, once the general principles and application of a methodology are deemed reliable under *Daubert*, any further criticisms of the quality of the analysis actually performed are for the jury to evaluate—not for the court. Indeed, permitting expert testimony takes on even greater imperative when such testimony is offered by the defense, in light of the defendant's Sixth Amendment's "right to call witnesses in order to present a meaningful defense at a criminal trial." *Howard v. Walker*, 406 F.3d 114, 131 (2d Cir. 2005). In *Howard*, the Second Circuit reversed the district court's denial of the state prisoner's § 2254 habeas petition, in part, because the state trial court effectively precluded the defendant's expert testimony on the cause of the victim's death by entering an order that would have allowed the government to ask the defense expert highly prejudicial and otherwise inadmissible statements.[4] Thus, even on collateral attack of a state conviction, this

[4] Indeed, the result in *Howard* is all the more persuasive because the petitioner litigated his § 2254 petition under the exacting standards set by the Antiterrorism and Effective Death Penalty Act, Pub. L. No. 14-132 (1996).

Circuit has recognized the importance of expert testimony generally, and to the criminal defendant specifically.

II. Dr. Lyter Is Qualified to Conduct Ink-Dating Analysis Using the Gas Chromatography/Mass Spectrometry Procedure, which Is a Generally Accepted Methodology for Determining the Relative Age of Ink Entries, and which Dr. Lyter Correctly Applied Here.

As a threshold issue, it is not seriously in dispute that Dr. Lyter is qualified to opine regarding the results of ink-dating analysis using GC/MS. He has decades of experience as a forensic chemist, both in academia and in government, and has specific expertise and experience in the use of the GC/MS procedure, as demonstrated by his expert retentions and public speaking engagements. Similarly clear is the baseline premise that GC/MS is a generally accepted technique for ink-dating in the field of forensic chemistry—a fact that the government's own rebuttal expert, Mr. LaPorte, agreed with in this case, and in others.

A. Dr. Lyter Is An Expert In Ink Dating Analysis Using GC/MS Instrumentation.

Dr. Lyter has the credentials and experience with GC/MS analysis to qualify as an expert in this field. Dr. Lyter holds a Ph.D. in analytical chemistry from the University of North Carolina – Chapel Hill. Ex. B (Tr. 2796:9–10); KIT Ex. 10004, at 10. Analytical chemistry is a measurement science. It uses the principles of chemistry—that is, the way molecules are put together—and measuring instruments to detect either the identity of a chemical or the existing state of the chemical and how it has changed over time. Ex. B (Tr. 2796:11–17). In addition to his Ph.D., Dr. Lyter obtained a Master of Science degree in forensic science from George Washington University, as well a Bachelor of Science degree in both Chemistry and Biology from Oklahoma City University. Ex. B (Tr. 2796:5–8); KIT Ex. 10004, at 10.

Dr. Lyter is a distinguished member of the forensic scientific community. Dr. Lyter is a Fellow in the Criminalists Section of the American Academy of Forensic Sciences, and a member of the Mid-Atlantic Association of Forensic Scientists, the California Association of Criminalists, the Southwestern Association of Forensic Document Examiners, the International Association of Forensic Sciences, the American Chemical Society, the Society for Applied Spectroscopy, and the American Society for Testing and Materials.[5] Ex. B (Tr. 2803:1–21); KIT Ex. 10004, at 11. Dr. Lyter has published papers on multiple topics within the field of forensic science, including physical and TLC ink analysis, and has presented his research at industry conferences. KIT Ex. 10004, at 11.

Dr. Lyter practices as forensic chemist[6] in both the private and public sectors for clients including the Attorneys General of Pennsylvania and Ohio, the federal Bureau of Land Management, the federal Bureau of Indian Affairs, district attorneys in Pennsylvania and Virginia, and numerous other national and international organizations and individuals. Ex. B (Tr. 2797:4–15). From January 1975 to September 1981, Dr. Lyter served as a forensic chemist at the Bureau of Alcohol, Tobacco, and Firearms within the United States Treasury Department. KIT Ex. 10004, at 10. In addition, he has served as an instructor to, among other federal organizations, the Federal Bureau of Investigations Academy, the Federal Law Enforcement

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[5] This Court should reject the government's impugning of Dr. Lyter's professional accomplishments with the suggestion that his lack of membership in the American Society of Questioned Document Examiners in some way lessens the significance of his membership in, and contributions to, the many professional organizations. *See* Ex. B (Tr. 2891:2–2892:2). In fact, as the government was forced to concede in this line of questioning, Dr. Lyter presented his research before a meeting of this organization in August 2017. *See id.* Notably, Mr. LaPorte, in his Declaration, highlighted *his own* membership in two of the same organizations that Dr. Lyter is a member of—the American Academy of Forensic Sciences and the Mid-Atlantic Association of Forensic Scientists. KIT Ex. 10005, at 6, ¶5.

[6] A forensic chemist uses "chemical principles and techniques to examine materials that would be associated with some legal proceeding." Ex. B (Tr. 2796:20–2797:1).

Training Center, the Naval Investigative Service, the Air Force Office of Special Investigation, and the United States Secret Service. KIT Ex. 10004, at 10.

Dr. Lyter has been utilizing the GC/MS technique for ink analysis since at least 2006. Ex. B (Tr. 2808:21–23). As recently as August 2017, Dr. Lyter presented research on the analysis of ink on artificially aged documents before a meeting of the American Society of Questioned Document Examiners. Ex. B (Tr. 2805:15–25); *see* Ex. C, at 10. Dr. Lyter utilized GC/MS for the ink analysis he presented at this conference. Ex. B (Tr. 2807:12–16); *see* Ex. C, at 36 (providing an abstract summary for Dr. Lyter's presentation titled "Artificial Aging and the Solvent Loss Ratio Method of Ink Dating"). In fact, Dr. Lyter has been presenting on the topic of GC/MS testing since 2007, when he presented "Analysis of Writing Ink by Gas Chromatography-Mass Spectrometry: Batch Variations" before the American Academy of Forensic Sciences. Ex. B (Tr. 2807:17–2808:23); KIT Ex. 4642, at 51–52.

Within the past five years, Dr. Lyter has testified in court as an ink analysis expert approximately 25-30 times. Ex. B (Tr. 2809:7–9). In total, over the course of his professional career, Dr. Lyter has testified in court as an ink analysis expert in excess of 200 times. Ex. B (Tr. 2809:4–6). Within the Southern District of New York, Dr. Lyter was qualified as an expert in ink analysis (physical examination and TLC) in *United States v. Stewart, et al.*, 1:03-CR-00717 (S.D.N.Y.) (Cedarbaum, J.). *See* Ex. B (Tr. 2810:10–2811:15).

Dr. Lyter has testified as an expert with respect to the GC/MS technique of ink analysis in three cases: (1) *Commonwealth v. Picone* (Penn. 2016), (2) *Verona Equities v. Corsaro Corporation* (N.J. 2014), and (3) *Marriage of Faidi* (Cal. 2011/2012). KIT Ex. 10004, at 2; *see* Tr. 2815:20–2816:6. In addition, Dr. Lyter was retained as an expert with respect to the GC/MS technique of ink analysis in three additional cases for which he provided deposition testimony,

but was not required to provide trial testimony: (1) *Sassaman v. Gugliotta* (N.J. 2014), (2) *Quality Home Health v. Stollings* (Wis. 2014), and (3) *Gugliatto v. Cochise* (Fla. 2012). KIT Ex. 10004, at 2. In addition to trial and deposition testimony, Dr. Lyter has been retained as a consultant in the field of ink analysis using the GC/MS technique at least 100 times over the course of his career. Ex. B (Tr. 2809:21–2810:2). Dr. Lyter has never been excluded as an expert on ink dating using the GC/MS technique of analysis. Ex. B (Tr. 2815:15–19).

B. GC/MS Is a Generally Accepted Methodology for Ink-Dating Analysis that Dr. Lyter Reliably Applied in this Case.

It is not (and cannot genuinely be) disputed that the GC/MS Solvent Loss Ratio technique is a generally accepted methodology for ink-dating in the field of forensic science. *See* Ex. B (Tr. 2812:22–2813:5) ("Q: Is it generally accepted in the field to use a GC/MS technique for analyzing the date of an ink? A: It certainly - - there are a variety of GC/MS procedures and techniques that are in the literature that have been used for the analysis of inks to determine when the writing occurred. So that answer to your question is yes."); KIT Ex. 10005, at 9, ¶27). Dr. Lyter testified as to the general acceptance of the GC/MS technique during his direct testimony at the *Daubert* hearing. Ex. B (Tr. 2812:22–2813:5). Dr. Lyter testified that he was unaware of any court that had excluded GC/MS as a technique for the dating of ink. Ex. B (Tr. 2813:3–5). Mr. LaPorte agrees. *See* KIT Ex. 10005, at 9, ¶27. In his Declaration, Mr. LaPorte confirmed the general acceptance of the GC/MS technique, stating: "All of my opinions expressed in the aforementioned paragraphs are based on widely accepted scientific principles and methodologies." *Id.*; *see id.* ¶ 18 ("As a matter of background, GC/MS is routinely used for chemical analysis in forensic laboratories throughout the world, and is a method that can be used to identify different and specific substances in a test sample."). In fact, during his cross-examination, Mr. LaPorte testified that he has previously served as an expert in federal court on

the topic of ink analysis utilizing the GC/MS technique.[7] Tr. 3003:2–22. Indeed, multiple courts have long recognized that the GC/MS technique is a scientifically validated methodology for chemical analysis of complex mixtures. *See United States v. Vitek Supply Corp.*, 144 F.3d 476, 485 (7th Cir. 1998) (finding that the GC/MS technique was "widely used and generally accepted in the fields of analytical and forensic chemistry"); *United States v. Aman*, 748 F. Supp. 2d 531, 542–43 (E.D. Va. 2010) ("His examination [for chemical residue from ignitable fluids] required the use of gas chromatography/mass spectrometry [], a technique that separates the components in a mixture and identifies the chemicals based on their mass spectrum. This technique has been widely recognized as sufficiently reliable to pass muster under *Daubert*.").

Importantly, Dr. Lyter's Solvent Loss Ratio methodology using the GC/MS technique has been validated both internally and externally. *See* Ex. B (Tr. 2904:2–3; 2870:25–2871:9; 2904:24–2905:5; 3037:6–23). Internally, Dr. Lyter has validated his methodology in a laboratory. Ex. B (Tr. 2904:2–3). He validated his methodology by "running multiple samples" through the GC/MS machines at Duke University and North Carolina State University and by "conduct[ing] [his] testing on a set of samples with undisputed and known ages of ink." Ex. B (Tr. 2904:4–10). Although the government attempted to cast aspersions on Dr. Lyter's internal validation, Mr. LaPorte ultimately testified to performing an indistinguishable procedure himself, and to confirming the reliability of his methodology by performing his GC/MS analyses in the

[7] Notably, in *Ceglia v. Zuckerberg*, the case in which both Dr. Lyter and Mr. LaPorte served as ink analysis experts on behalf of the defendant, the United States District Court for the Western District of New York rejected the plaintiff's argument that GC/MS testing was unreliable and not accepted within the scientific community. *See Ceglia v. Zuckerberg*, No. 10-CV-00569A(F), 2013 WL 1208558, at *25 (W.D.N.Y. Mar. 26, 2013) ("Insofar as Plaintiff argues the PE test [GC/MS] is unreliable because it has never been published or subjected to peer review, nor been accepted within the scientific community [], evidence in the record establishes otherwise."), *report and recommendation adopted*, No. 10-CV-00569-A, 2014 WL 1224574 (W.D.N.Y. Mar. 25, 2014).

same manner each time. *Compare* Ex. B (Tr. 2904:12) (Lyter: "It's the same way. I do the testing the same way."), *with* Ex. B (Tr. 2984:20–23) (LaPorte: "I do the exact - - I would say I've had people watch me, and they say I work like a robot, I do the exact same thing every single time, and I generally would not deviate from that in any way whatsoever."). Whereas Mr. LaPorte claims to have a written word document explaining his protocol, *see* Ex. B (Tr. 2984:7–17), Dr. Lyter explained that his validation data, although not written down, would be available on the GC/MS instruments at either Duke or North Carolina State Universities. Ex. B (Tr. 2907:14–21). In any event, Mr. LaPorte previously testified that it is not essential to write down a testing protocol for validation purposes. *See* Ex. E (Tr. 248:8-21).

Externally, Dr. Lyter's Solvent Loss Ratio methodology has been validated by Marc Gaudreau, the author of one of the academic articles relied upon by both Dr. Lyter and Mr. LaPorte. Ex. B (Tr. 2870:25–2871:9; 2904:24–2905:5; 3037:6–23); *see* Ex. B (Tr. 2846:22–24) (Q: Is this the article you were referencing, Dr. Lyter, that you relied on in developing your methodology? A: Yes, that's one of them."); Ex. B (Tr. 3009:3–5) (LaPorte: "Yeah, [the Gaudreau article] is a good paper. Like I said, I use it as part of my overall breadth of articles to rely upon as well too."). As Dr. Lyter testified during the *Daubert* hearing, Mr. Gaudreau was retained to independently perform an ink-dating analysis in a case in which Dr. Lyter had also performed ink-dating analysis using the GC/MS technique. Ex. B (Tr. 2870:14–2871:9). Importantly, Dr. Lyter's results were not known to Mr. Gaudreau at the time Mr. Gaudreau performed his analysis. *Id.* Ultimately, Mr. Gaudreau's results matched Dr. Lyter's results that were obtained using the same methodology and testing protocol he employed here. *Id.* (Lyter: "It was as a test basically. He was asked by the Court to reproduce the analysis that I had done.

And he did so and came to the same results as I did. And he was not aware that that's what was happening.").

Accordingly, the GC/MS technique for ink-dating analysis is an appropriate topic for expert testimony. Dr. Lyter's internally- and externally-verified protocols for the ink analysis of the Smyth notebooks and the results he obtained are, similarly, an appropriate topic for Dr. Lyter's expert testimony in this case.

III. The Alleged Quality Control Deficiencies in Dr. Lyter's Ink Analysis go to the Weight, not Admissibility, of his Testimony and are Speculative in any Event.

Unable to attack the general validity of the Solvent Loss Ratio methodology for dating ink, the government instead levels its attack solely at whether Dr. Lyter "reliably applied" the GC/MS methodology to the pages of Smyth's notebooks. *See* Fed. R. Evid. 702(d). The issues raised by the government and its rebuttal expert, Mr. LaPorte, do not warrant exclusion of Dr. Lyter's testimony. Each of these purported "flaws"—related to issues of quality control and possible contamination—rely on rank speculation and, at most, constitute "a slight modification of an otherwise reliable method," *Amorgianos*, 303 F.3d at 267, the wisdom of which the government is free to explore through "vigorous cross-examination," *Daubert*, 509 U.S. at 596. Ultimately, none of these concerns is sufficient to undermine the overall reliability of Dr. Lyter's testimony, leaving only arguments regarding the proper weight the jury should give Dr. Lyter's testimony.

A. Alleged Lack of Quality Control to Ensure GC/MS Instrument Is Functioning Normally and Not Contaminated.

The government first argues that Dr. Lyter failed to take a number of quality-control measures to ensure that the lab equipment was operating properly, and that the ink samples from the Smyth notebooks were not contaminated in a way that would affect the GC/MS readings.

Among other things, the government contends that Dr. Lyter failed to test either blank pages of the Smyth notebooks or blank samples of the relevant solvent to determine whether the GC/MS instrument was capturing the amount of PE in the ink itself, (or, alternatively, whether the notebook paper or any residue in the GC/MS instrument were contributing contaminants). These criticisms are without merit, both legally and factually.

Concerns regarding quality control and other allegations of "imperfectly conducted laboratory procedures [are] better approached as [issues] going not to the admissibility, but to the weight" of expert testimony. *See United States v. Hicks*, 103 F.3d 837, 846 (9th Cir. 1996) (citation omitted); *United States v. Beasley*, 102 F.3d 1440, 1448 (8th Cir. 1996). For example, in *United States v. Aman*, 748 F. Supp. 2d 531, 542–43 (E.D. Va. 2010), the defendant argued that the government's GC/MS expert failed to properly control for quality because he did not examine so-called "comparison samples" when he evaluated the crime scene for flammable materials, such as gasoline. Although this practice deviated from the accepted guidance, the district court allowed the testimony, explaining that the government's expert had testified that this practice was "not always necessary," and it was not necessary there because the government's expert pointed to other factors supporting his conclusion that there was gasoline at the scene. *Id.* at 543. The district court did not discount the defendant's concerns, yet concluded that these practices "may be appropriate for cross-examination, but the testimony need not be excluded on this basis." *Id.*

Here, Dr. Lyter testified that he *did* control for various sources of potential error and contamination in numerous ways. Dr. Lyter ensured that the samples he took did not have ink on the reverse side of the page to avoid contamination. Ex. B (Tr. 2833:10-17). He also testified that he was aware of cleaning protocols with respect to the GC/MS machine at the laboratory

where he conducted the analysis at issue. Ex. B (Tr. 2842:17-2843:8). Dr. Lyter also testified that he took multiple samples of ink that appeared similar under physical examination and later were found to be identical after TLC analysis. Ex. B (Tr. 2828:14-21). Those identical inks on separate pages exhibited virtually the same initial levels of PE, which, as described *infra*, results served as an internal control proving that the notebook paper was not contaminated or affecting the results in any way. Ex. B (Tr. 3020:22-3021:6); *infra* pp. 36-38.

That Mr. LaPorte testified that additional quality control measures were necessary—namely, testing page and solvent blanks—does not make it so, and the jury should consider these criticisms when it decides what weight to afford Dr. Lyter's testimony once it has been admitted. *See United States v. Johnson*, 56 F.3d 947, 953 (8th Cir. 1995) ("The district court was entitled to credit Dr. Deadman's testimony that the variations were minor and would not substantially undermine the results. Dr. Libby's testimony to the contrary went more appropriately to the weight than to the admissibility of the scientific evidence in this case.").

B. Speculation Regarding Potential Contamination.

Mr. LaPorte spent the lion's share of his testimony speculating whether Dr. Lyter may have introduced contamination into his analysis. *See, e.g.*, Ex. B (Tr. 2978:10-2979:20). But all such testimony merely identifies "[t]he potential for contamination," which can be addressed via cross-examination or through Mr. LaPorte's rebuttal testimony at trial. *Hicks*, 103 F.3d at 846 (citation omitted). Indeed, in *Hicks,* the Ninth Circuit affirmed the admission of the government's expert testimony because the defendant "not only engaged in extensive cross-examination on the issue of contamination, but [] also called his own experts to testify to the dangers of contamination." *Id.* Any "challenges to the laboratory protocols" at issue "d[i]d not weigh against the admissibility" of the government's expert testimony, but rather went to its weight. *Id.* Moreover, if the government genuinely had concerns regarding contamination of the

notebook pages by external sources, it had exclusive access to the Smyth notebooks for a long period of time, and could have employed the GC/MS methodology at any point to mount a defense to the authenticity of the notebooks. *See Beck v. Koppers, Inc.*, 2006 WL 5441386 (N.D. Miss. Feb. 3, 2006) (explaining that plaintiffs' expert disclosure allowed defendants to test environmental samples for presence of chemical).

But the suggestions of potential contamination aired at the Daubert hearing are baseless in any event. Mr. LaPorte raised two issues: (i) that the GC/MS instrument was contaminated from prior use, *see* Ex. B (Tr. 2979:11-16), and (ii) that the notebook pages might have been handled by someone wearing a product containing PE, *e.g.*, cologne or perfume, *see* Ex. B (Tr. 2978:17-22). Both criticisms are readily dismissed.

First, the temperature of the GC/MS instrument was raised during each run of an ink sample to a level that would have cleared any contaminants. The retention time of PE is approximately 5.4 minutes, but Dr. Lyter permitted the GC/MS instrument to run at increasingly higher temperatures for longer than 15 minutes. Ex. B (Tr. 3034:5-19). During ***each*** run of an ink sample, the internal temperature of the GC/MS instrument thus went up to 250 degrees Celsius. Ex. B (Tr. 3034:15-19). That level of heat—and the lengthy duration of each sample run—were, in conjunction, more than sufficient to clear the GC/MS instrument of any interfering contaminants that might have been in the range where PE was being detected (*i.e.*, at the approximately 5-minute mark of the run cycle), and avoid a so-called "carryover" effect impacting the measurement of PE. Ex. B (Tr. 3022:15-3023:2; 3033:15-3034:22). Moreover, any remnants of PE in the machine—whether caused by a prior student, researcher, or sample—would be completely destroyed ***at the end of each sample run***. *See id.* That mode of testing is precisely why each ink-sample run is independent and self-contained; the results of one sample

run do not affect the results of any other run. *See* Ex. B (Tr. 2868:17-22). It is not as if Dr. Lyter intervened to stop the GC/MS instrument runtime once he had obtained a satisfactory reading for PE—indeed, he specifically testified that he did no such thing, but permitted the instrument to go through a complete run before loading it for the next sample. Ex. B (Tr. 3034:5-13). If Dr. Lyter had artificially halted the heating process close to the point in time where PE was detected, it might plausibly be argued that the instrument would not be cleared of all PE remnants for the next sample run. But he did exactly the opposite—allowing the instrument to get up to 250 Celsius for over 16 minutes every time it was run, thus flushing the system of all components associated with PE and the internal standard, cresol.

Dr. Lyter's testimony regarding contamination-risk reduction is corroborated by the appended Declaration of Dr. Taufika Williams, Ph.D, the Director of the North Carolina State University Mass Spectrometry Facility where Dr. Lyter conducted the ink-dating analysis at issue here (attached hereto as Ex. D). Dr. Williams's declaration sets forth the cleaning protocols employed by the lab facility to eliminate the risk of contamination. For example, only persons with specific training in use of the GC/MS machine are permitted to use the machine without staff assistance. Ex. D at 1-2, ¶¶ 3-4. Dr. Lyter is, of course, so-authorized to self-use the GC/MS instrument by virtue of his training. *Id.* The GC/MS machine "has an autotune feature that is run on the days of instrument usage," and "is cleaned and checked for contamination by Facility staff approximately every 100 sample runs." *Id.* at 2, ¶ 5. The facility conducts a full cleaning and decontamination of the GC/MS machine when "alerted by users to possible contamination or dirtiness." *Id.* According to Dr. Williams, the "Facility has not received complaints of contamination or dirtiness affecting the results generated by the GC/MS

instrument maintained at the Facility. Nor has the [Facility] received reports from users of significant error rates affecting the results generated by its GC/MS instruments." *Id.* at 2 ¶ 6.[8]

Second, the suggestion that an external source of PE—like perfume or cologne on someone's hands—affected all of the notebook entries Dr. Lyter tested that came back as having been recently created is far-fetched to say the least. Even Mr. LaPorte would agree: In the Facebook case where Mr. LaPorte conducted GC/MS testing to prove the recent fabrication of entries on a contract, opposing counsel raised—at a deposition—the remote possibility that the presence of PE in household products meant the ink on the contract could have been contaminated with extant PE, thus rendering Mr. LaPorte's testing unreliable. Mr. LaPorte appropriately dismissed any such purported contamination from handling of the document as a "very, very, very minute possibility" that was "unrealistic" and "improbable":

LaPorte Depo. Tr. Cite	Question	Answer
216:24-217:9	"What's your basis for believing that not that many contain PE if you don't know?"	"Generally I actually look at the ingredients on a lot of household labels. I mean, I do that as a chemist. I've never really -- I have never seen anything that says it has phenoxyethanol. Certainly I've published and I know that there are some colognes that could have phenoxyethanol. There are those types of things."
217:10-13	"Have you ever done a search for household products that have PE in them, online or whatever?"	"I haven't, no."

[8] Mr. LaPorte testified that a GC/MS instrument must be dedicated exclusively to ink analysis—presumably because he owns one—but Dr. Lyter countered that he is unaware of any article in the peer-reviewed literature, other than the unpublished Gaudreau and Aginsky manuscript the government introduced (GX Ex. 3544), that imposed such a requirement on GC/MS ink-dating. Tr. 3022-23

LaPorte Depo. Tr. Cite	Question	Answer
217:14-218:5	"Let's hypothetically say that sunblock and bug spray all have -- both have PE in them. All right? That's hypothetical. If those come in contact with a document, they're going to add PE to the document; right? If you spray bug spray with PE on it on a document, it's going to add PE -- right? -- as a chemist?"	"You would see that on a paper. When you're talking about ink lines, though, you're talking about applying phenoxyethanol to these very, very small ink lines. That doesn't seem like a reasonable -- like a reasonable argument. It's a -- we can't eliminate every single possibility in the world, but that would be a very, very, very minute possibility."
220:6-11	"How did you rule out contamination?"	"Based on the quality control samples, based on the fact it didn't show up in the other blanks, based on the fact that is just a very, very -- that's -- just the probability of doing that is just unrealistic."
220:12-16	"Then why do paper blanks from around the ink if the probability is unrealistic? Why are you checking for contamination?"	"So I can answer this question that you're asking me."
220:17-221:2	"So probability is one thing. The possibility you're not ruling out, but the probability in this case you're saying is low?"	"I'm just saying that based on consideration of everything around -- which includes the quality control sample, I didn't find it anywhere else. It would have to hit the exact same spot where I tested, which was actually those holes were 0.5 millimeters. So somebody would have to touch that area, that 0.5 millimeter area."
221:3-5	"With their finger with some kind of contaminant?"	"Right."
221:6-8	"And then you would have extra PE in your test?"	"It doesn't seem realistic so me."

LaPorte Depo. Tr. Cite	Question	Answer
221:9-16	"And if your paper blank is not in that same area where their thumb touched it or their fingerprint touched it, your paper blank wouldn't show PE but you would have a bunch of extra PE where you pulled the ink plug. Fair to say?"	"And it only happened in the interlineation but it didn't happen on anything else?"
221:17-19	"I'm just saying in the interlineation for right now. That's possible?"	"It's improbable."

Ex. E (LaPorte Depo. Tr. 217-21). Importantly, and as noted above, Mr. LaPorte testified that ruling out contamination from external sources of PE is possible ***not only*** based on paper-blanks testing, but also because—purely as a practical matter—the likelihood that someone would touch the very 0.5mm portions of ink lines from which ink samples are later extracted is vanishingly small. Here, Dr. Lyter extracted 0.5mm samples from ***four different areas*** of every tested handwritten entry, with the samples far apart, and the notion that every one of those 0.5mm samples was contaminated by an external source of PE in a magnitude that would affect the GC/MS test is fanciful at best.

C. Suggestion that the Paper May Have Contained PE to Begin With or that Ink Traveled from One Entry to Another.

Mr. LaPorte also suggested that paper-blank testing was essential to ensure that the composition of the paper did not contain PE to begin with, and that ink had not diffused from one entry to another while the notebooks were closed. Ex. B (Tr. 2978:10-16). Those criticisms of Dr. Lyter's methodology fail for at least four reasons.

First, given the circumstances of the testing here—individual ball-pen entries on identical paper from the same type of notebooks—the testing of paper blanks was not necessary to ensure reliable results because of the way the R% formula is structured. There is no dispute

that the notebooks—and hence the composition of the paper comprising the notebooks—are identical. Any baseline PE in the composition of the paper would thus appear in the vials for ***both*** the heated and unheated ink samples from the paper—once both such samples are mixed in those vials with an extraction solvent to draw out any chemicals from the micro plugs containing ink and paper—with the result that any such baseline PE concentration in the paper (to the extent it existed) would be accounted for in ***both variables*** of the R% formula. Because those ink samples—from the same entry on the same page—were compared ***only against each other*** after one sample was heated, the loss ratio of PE would be unaffected in any material way: The baseline PE level would be reflected in both of the variables derived from the unheated and heated samples—elevating them both equally as an initial matter—before a comparison between the two was calculated to achieve the solvent loss ratio. Indeed, as shown below, the fact that one of the variables—the one for the untreated sample that would retain all PE attributable to the paper composition by virtue of not having been heated—also is the ***denominator*** in the formula means that any baseline PE levels in the composition of the paper would increase the magnitude of that denominator and thus ***depress***, not elevate, the calculated R% value.

Therefore, it is highly improbable that any baseline PE level in the composition of the paper would result in a false positive (and, in fact, it would more likely lead to a false negative result by lowering the calculated R% value). The math demonstration below proves this point. The first column assumes an R% calculation with no baseline PE contamination in the paper, so the formula proceeds normally (unheated PE concentration minus heated PE concentration, with the result divided by the unheated PE concentration and converted to a percentage). The second column assumes, for purposes of argument, that the baseline level of PE contamination in the paper itself was 5,000 units of abundance (and thus 5,000 units are added to the concentration of

both the unheated and heated samples, accounting for the extra PE in the paper that would be affected by heating, because they come from adjacent positions on the same paper). The internal standard, which is cresol not PE, is unaffected by the baseline level of PE contamination:

Original R% Calculation	**R% Calculation Assuming Composition of Paper Contaminated with 5,000 Abundance Units of PE**
$R = \frac{\text{UH-Abundance/IS} - \text{H-Abundance/IS}}{\text{UH-Abundance/IS}}$ $R = \frac{10{,}000/1{,}000 - 5{,}500/1{,}000}{10{,}000/1{,}000}$ $R\% = \frac{10 - 5.5}{10} \times 100$ [multiply for percent] $R\% = \frac{4.5}{10} \times 100$ $R\% = 45\%$ **Significant finding at 35% threshold**	$R = \frac{\text{UH-Abundance/IS} - \text{H-Abundance/IS}}{\text{UH-Abundance/IS}}$ $R = \frac{10{,}000+\mathbf{5{,}000}/1{,}000 - 5{,}500+\mathbf{5{,}000}/1{,}000}{10{,}000+\mathbf{5{,}000}/1{,}000}$ [contamination adjustment shown in **bold**] $R = \frac{15{,}000/1{,}000 - 11{,}000/1{,}000}{15{,}000/1{,}000}$ $R\% = \frac{15 - 10.5}{15} \times 100$ [multiply for percent] $R\% = \frac{4.5}{15} \times 100$ $R\% = 30\%$ **Non-significant finding at 35% threshold**
$R = \frac{\text{UH-Abundance/IS} - \text{H-Abundance/IS}}{\text{UH-Abundance/IS}}$ $R = \frac{20{,}000/4{,}000 - 6{,}000/2{,}000}{20{,}000/4{,}000}$	$R = \frac{\text{UH-Abundance/IS} - \text{H-Abundance/IS}}{\text{UH-Abundance/IS}}$ $R = \frac{20{,}000+\mathbf{5{,}000}/4{,}000 - 6{,}000+\mathbf{5{,}000}/2{,}000}{20{,}000+\mathbf{5{,}000}/1{,}000}$ [contamination adjustment shown **in bold**]

R% = $\frac{5 - 3}{5}$ X 100 [multiply for percent] R% = $\frac{2}{5}$ X 100 R% = 40% **Significant finding at 35% threshold**	R = $\frac{25{,}000/4{,}000 - 11{,}000/2{,}000}{25{,}000/4{,}000}$ R% = $\frac{6.25 - 5.5}{6.25}$ X 100 [multiply for percent] R% = $\frac{0.75}{6.25}$ X 100 R% = 12% **Non-significant finding at 35% threshold**

As the above demonstration illustrates, any baseline contamination of PE in the paper on which ink is written will not lead to false positive results if the test is—as it was here—an internal comparison of ***ink samples from the same entry on the same type of paper***. The only plausible way in which baseline PE contamination in paper would affect results is ***if ink on different papers*** was being compared. In that case, the baseline PE level could be different for each paper composition and the same number would not be taken into account as a component of both variables of the R% formula. But here, as noted above, there is no dispute that the five notebooks—***and hence the composition of the paper comprising the notebooks***—are identical to one another. Any PE in the composition of the paper would have been picked up in ***every*** sample taken for GC/MS analysis and, as demonstrated above, such baseline PE contamination (purely a matter of speculation anyway) would not have affected the significant results at all. There was no testimony to the contrary at the *Daubert* hearing.

Second, as Dr. Lyter testified, the way he structured his testing ensured an internal control that, itself, proved no PE contamination in the notebook paper. Following physical examination and TLC analysis, Dr. Lyter was able to identify which formulations of ball-pen ink were identical to one another (meaning they would contain the same level of PE to begin with when applied to paper). Ex. B (Tr. 2828:14–2829:2). That finding, in turn, allowed Dr. Lyter to

test via GC/MS the ***same kind of ink on different pages*** of the notebooks. Ex. B (Tr. 2945:15-18). If PE contamination had actually occurred—whether via diffusion of ink across pages while the notebooks were closed or handling by someone wearing perfume/cologne on their fingers—the initial PE levels detected in unheated ink samples of the same inks from these different pages would be expected to be different and have wide swings (reflecting differing levels of PE contamination on the different pages). Ex. B (Tr. 3021:1-6).

But, critically, that was not the case. The same formulation of ink placed on different pages of the notebook contained approximately the same amount of PE in unheated samples, which is a powerful indication that no external sources of PE contamination affected the notebooks. Ex. B (Tr. 3020:20-3022:10). For example, the entries tested on Bates-page 17475 (KIT Ex. 10004 at p. 39), Bates-page 17627 (KIT Ex. 10004 at p. 67), and Bates-page 17730 (KIT Ex. 10004 at p. 116), were made with the same formulation of blue ink. *See* KIT Ex. 10004 at 25, 29 (TLC worksheets noting that these three inks were the same blue ball-pen coded as B). The initial PE levels detected in those different entries, on different pages, made with that same ink were almost identical—approximately a concentration of 2 nanograms/microliter, when normalized by dividing the 94-mass ion value on each mass spectrum by the internal standard value handwritten therein. *Compare* KIT Ex. 10004 at p. 40 *with* KIT Ex. 10004 at p. 68 with KIT Ex. at p. 117. The same holds true for handwritten entries on Bates-pages 17623 (KIT Ex. 10004 at p. 60), 17665 (KIT Ex. 10004 at p. 95), and 17770 (KIT Ex. 10004 at p. 137)—all of which were made with the same black ball-pen coded as F. *See* KIT Ex. 10004 at 25, 29 (TLC worksheets noting that these three inks were the same blue ball-pen coded as B). No diffusion of PE from adjacent pages or adjacent entries was observed (because there were no wide swings in

the results), and any suggestion to the contrary is rank speculation—***not*** a grounds for exclusion under *Daubert*.

Third, even Mr. LaPorte conceded in the Facebook case that testing paper blanks is, in all likelihood, unnecessary to rule out PE contamination from other sources. When asked whether such external contamination could have occurred, Mr. LaPorte responded that the sheer number of samples he took from the contract at issue there—from multiple different lines—made such skewing of his results improbable. *See supra* pp. 32-33. When pushed as to why Mr. LaPorte did paper-blank testing at all then, if the likelihood of contamination was so small, he stated it was purely so he could have an answer to deposition questions on the subject:

LaPorte Depo. Tr. Cite	Question	Answer
219:22 - 220:5	"Sir, I'm just saying you don't know if your paper blank and the ink from the interlineations came - - you don't know the proximity of those two blanks to each other that you took?"	"I'm a hundred percent confident that there wasn't any phenoxyethanol contamination. I think that's the best way I can put it."
220:6-11	"How did you rule out contamination?"	"Based on the quality control samples, based on the fact it didn't show up in the other blanks, based on the fact that is just a very, very -- that's -- just the probability of doing that is just unrealistic."
220:12-16	"Then why do paper blanks from around the ink if the probability is unrealistic? Why are you checking for contamination?"	"So I can answer this question that you're asking me."

Fourth, in Mr. LaPorte's deposition in the Facebook case defending his use of the Solvent Loss Ratio methodology, he explained—contrary to his testimony at the *Daubert* hearing, *see* Ex. B (Tr. 2978:10–16)—why the proximity appearance of ink entries ***in a notebook***

(as opposed to on loose paper sheets) should not create significant reliability problems for the test:

LaPorte Depo. Tr. Cite	Question	Answer
215:8-11	"Are storage conditions of a document irrelevant to the amount of PE?"	"They don't make the PE increase. Storage conditions don't cause PE to increase."
215:12-216:2	"Well, that's not always true. If the storage conditions include proximity to a source of PE, you've got more PE on the document from that source?"	"You would detect that in the blank or you would have to -- you would have to physically press up two documents with each other. One -- **you would have to line up the inks exactly so that the inks are touching. You would probably have to exert some pressure. One ink would have to be fresh from the other document, because it can be -- once it's -- once the ink's put down on the paper, after just a couple days, I mean, it doesn't transfer anymore that easily.**"

There has been zero evidence that any of those special circumstances—in which ink might transfer from one entry to another adjacent entry existed—here with regard to the notebooks. There has been no testimony or showing that the places from which Dr. Lyter extracted ink samples for the Solvent Loss Ratio method lined up "exactly" with other ink entries containing PE when the notebooks were closed so that the "inks [we]re touching." There has been no testimony or showing that "pressure" was exerted on the notebooks while they were closed to encourage ink diffusion from one entry to another. And there has been no testimony or showing that the adjacent ink entries to the ones Dr. Lyter sampled were only "a couple days old" such that they were fresh enough to contribute PE to the samples extracted here. Therefore, the suggestion that ink diffused from different entries in the notebooks to the entries Dr. Lyter tested

is purely speculative. At a minimum, that circumstance has a vanishingly small likelihood and it offers no basis for wholesale exclusion of Dr. Lyter's ink analysis.

D. Failure to Internally Validate Testing Protocol.

The government also may argue that Dr. Lyter failed to internally validate his testing protocol. But Dr. Lyter expressly testified on cross-examination that he *did* validate his testing methodology internally. Among other things, he testified to "running multiple samples in the [] the facilities … where [he] used instrumentation," and also tested his methods using a "set of samples with undisputed and known ages of ink." Ex. B (Tr. 2904:2-10). That Dr. Lyter does not maintain printed data in his personal files to substantiate these internal validations, *see* Ex. B (Tr. 2907:14-23), does not undermine the fact that Dr. Lyter has good grounds to believe that his techniques reliably apply the GC/MS procedure for dating ink.

IV. Mr. LaPorte's Remaining Challenges to the Adequacy of the Testing Are Meritless or Were Abandoned at the *Daubert* Hearing.

In his October 2 affidavit, Mr. LaPorte identified a number of objections to Dr. Lyter's proposed testimony, most of which have been addressed, *supra*. The remaining objections, repeated primarily through the testimony of Mr. LaPorte at the *Daubert* hearing, are devoid of merit. The government appears, however, to have abandoned several other objections Mr. LaPorte initially raised in light of the undisputed record.

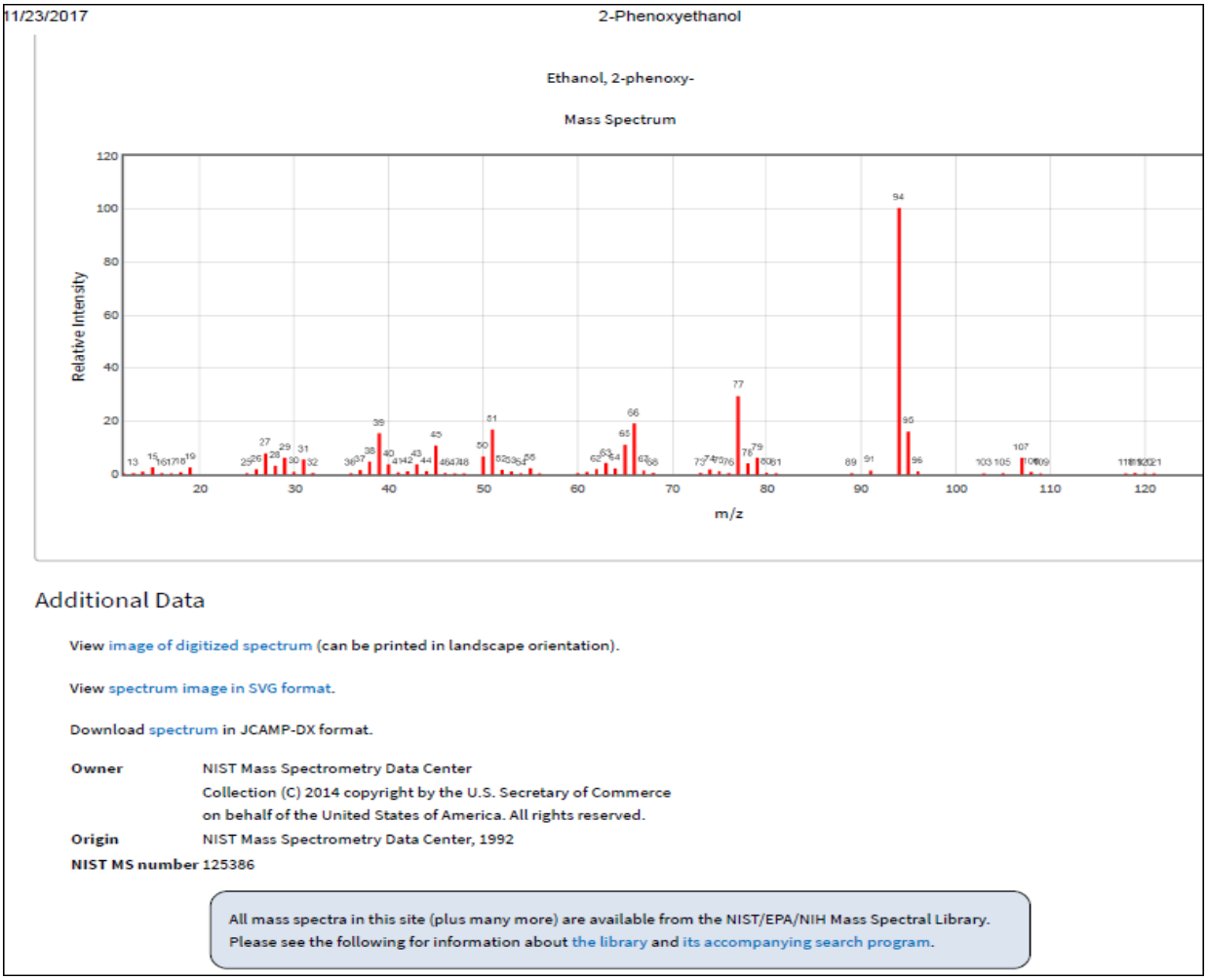
A. Use of Peak Heights Rather than Peak Areas to Calculate Results Based on Y-Axis Readings.

For the first time at the *Daubert* hearing—and without any notice in the rebuttal disclosure of Mr. LaPorte—the government challenged as unreliable Dr. Lyter's calculation of the PE concentration in heated and unheated ink samples using the height of peaks displayed on graphs produced by the GC/MS instrument. But it is simply not true, as a fundamental matter of

chemical analysis, that measuring peak heights ***from a mass spectrum***—which is what Dr. Lyter did—is an unreliable way to measure the concentration of a target chemical (here, PE). To the contrary, numerous published texts confirm that the concentration of an analyte (the chemical targeted for analysis) in a compound may be obtained by measuring the peak height for an ion (a charged particle) of a particular mass that is known to be associated with the analyte. *See, e.g.*, Kenneth L. Busch, Units in Mass Spectrometry, Current Trends in Mass Spectrometry, May 2003 ("Finally, we have left aside for now ***the y axis of the mass spectrum, which can be ion counts, number of ions, or (commonly) relative abundance or relative intensity***. Because the term 'intensity' usually refers to the height of a peak or the strength of an ion beam, ***the term 'relative abundance' is better used to refer to the number of ions in the mass spectrometer, which should be reflected in the y-axis value***." (emphasis added)), *available at* http://alfresco.ubm-us.net/alfresco_images/pharma /2014/08/22/8a3cdfc9-8dbe-4c81-bb7f-c7160fb9d3db/article-55961.pdf (attached hereto as Ex. F); Mass Spectrometry: Isotope Effects, Chemistry LibreTexts, Univ. of California at Davis ("The Y-axis on a mass spectrum is relative intensity. Therefore, ***the height of each of the peaks will correspond to the relative abundance of each isotope in the sample***." (emphasis added)), *available at* https://chem.libretexts.org/Core/Analytical_Chemistry/Instrumental_Analysis/Mass_Spectrometry/Mass_Spectrometry%3A_Isotope_Effects (last updated Dec. 18, 2013) (attached hereto as Ex. G); Intro to Gas Chromatography, Lab Guide for Chemistry 5181: Mass Spectrometry, Chromatography, and Research Methods, Univ. of Colorado at Boulder ("The computer records a graph for each scan. The x-axis represents the m/z ratios and ***the y-axis represents the signal intensity (abundance) for each of the fragments detected during the scan***. This graph is referred to as a mass

spectrum." (emphasis added)), *available at* http://cires1.colorado.edu/jimenez/CHEM-5181/Labs/Gas_Chromatography.pdf (attached hereto as Ex. H).[9]

As the reference mass spectrum for PE published by the National Institute of Standards and Technology makes clear, an ion with a mass of 94 will produce the highest peak in the signature mass spectrum for PE and is a characteristic feature confirming the presence of PE in the analyzed sample.



[9] As the government never before raised a challenge to the calculation of PE concentrations using peak heights rather than peak areas, Mr. Isaza Tuzman respectfully submits that the record may appropriately be expanded to include consideration of copious scientific literature rebutting that exact point.

See 2-Phenoxyethanol: Mass spectrum (electron ionization), Nat'l Inst. Of Standards & Tech., U.S. Dep't of Commerce, *available at* http://webbook.nist.gov/cgi/cbook.cgi?ID=122-99-6 (attached hereto as Ex. I). The concentration of PE in a mixture being analyzed can thus be determined by using as a proxy the abundance of its characteristic 94-mass ion displayed on the mass spectrum, which is the reading on the y-axis corresponding with the height of the 94 peak. *See* Ex. G, at 2 ("[T]he height of each of the peaks will correspond to the relative abundance of each isotope in the sample."). That abundance count is precisely what Dr. Lyter used as the basis for his calculation of PE in the samples run through the GC/MS instrument—by lining up the peak height of the 94-mass ion to see where it intersected with the y-axis and using the reading thus obtained. *See* Ex. B (Tr. 2859:16-22); KIT Ex. 4631 at 3.

The government—whether intentionally or through failure to seriously engage with the scientific principles at play—thoroughly confused this issue of peak-height measurement during the *Daubert* hearing. Dr. Lyter testified unequivocally that he used the ***mass spectrum***, the graphs appearing ***below*** the chromatogram on portrait-oriented printouts, as the source of his calculations for the concentrations of both PE and the internal standard, cresol. Ex. B (Tr. 2859:6-14, 2885:18-24). But the government quizzed Dr. Lyter only about the peak heights reflected on the ***chromatogram***, the ***top*** chart, and then accused him of wrongly using those height values for purposes of the R% formula rather than the peak areas under the chromatogram curves. *See* Ex. B (Tr. 2964:19-23). No competent scientific evidence was adduced in support of that hypothesis; instead, the government showed Dr. Lyter a single-page printout from a George Mason University website stating that, ***from a chromatogram***, "the preferred measurement is the area of the peak." *See* Ex. B (Tr. 2964-65); GX 3545. But what might have been the "preferred" measurement for a chromatogram reading was totally beside the point in

regard to Dr. Lyter's actual analysis using a mass spectrum, as he pointed out in response: "Right, this is when you're dealing with a chromatogram." Ex. B (Tr. 2965:19-23).

Even Mr. LaPorte did not appreciate the difference between a chromatogram and a mass spectrum, instead premising his critique of Dr. Lyter's measurements entirely on the hypothesis that peak areas rather than peak heights are the ***only*** appropriate measure of chemical abundance from a chromatogram. Notably, however, Mr. LaPorte did not venture any opinion at the hearing—let alone any scientific support—for the proposition that determining analyte concentration using the ***peak height of a characteristic ion for that analyte, as displayed in a mass spectrum***, is invariably an incorrect, unreliable practice in the field of mass spectrometry. The reason for Mr. LaPorte's omission is obvious—as numerous texts make clear, peak height from a mass spectrum ***is*** a generally accepted measure for the abundance in a mixture of a characteristic ion specific to a target analyte (which is identifiable by the mass spectrum pattern produced on the graph)—and, therefore, it is an appropriate proxy measure for the concentration of that analyte in the mixture (here, PE). *See supra* sec. IV.A.

Nor is it even true that using peak heights ***from a chromatogram***—which the government pretended Dr. Lyter did—is, itself, an incorrect method of measuring the concentration of a target chemical in a mixture. The document the government introduced on this score says just the opposite, stating that "[t]here are ***several measurements used*** to determine the size of the peak. ***They include height***, width and area." GX 3545 (emphases added). Even other scientific literature the government pointed Dr. Lyter to indicates that peak heights and peak areas are ***alternative*** measures of analyte concentration. *See* KIT Ex. 4643 at 24 ("Previous studies proposed the use of [Relative Peak Area] as an ***alternative*** ageing parameter in order to normalise obtained PE quantities and reduce sample variability." (emphasis added)). There was

no suggestion in any of the texts introduced at the hearing that using peak height as a measure of chemical abundance is flatly wrong—and, indeed, literature in the field has long confirmed that peak height is one appropriate measure of the concentration of a target analyte. *See, e.g.*, Chunlong Zhang, FUNDAMENTALS OF ENVIRONMENTAL SAMPLING AND ANALYSIS 258 (John Wiley & Sons, Inc. 2007) ("Quantitative chromatographic analyses are achieved by determining instrumental signals from the chromatograms. Signals are normally measured by ***peak area*** or less commonly by ***peak height***, either one of which should be in direct proportion with the change in analyte concentration." (emphasis in original)) (attached hereto as Ex. J); James S. Fritz & Douglas T. Gjerde, ION CHROMATOGRAPHY 35, § 2.9 (Wiley-VCH 4th ed. 2009) ("The most useful types of information are the peak retention times and the peak areas or peak heights. Retention times are used to confirm the identity of the various peaks, and peak area or peak height is a measure of concentration.") (attached hereto as Ex. K); Georges Guiochon & Claude L. Guillemin, QUANTITATIVE GAS CHROMATOGRAPHY FOR LABORATORY ANALYSES AND ON-LINE PROCESS CONTROL 672 (Elsevier Science Pub. 1988) ("There are many results that tend to show that peak height is often more precise than peak area. On the other hand, peak area tends to be more accurate. The choice, if it were made on purely rational reasons for each analysis would probably favor peak height in a significant minority of cases.") (attached hereto as Ex. L).[10] At most the literature says that using peak area tends to be more accurate for quantifying

[10] The authors Guiochon and Guillemin note that automatic calculation of peak area was a feature built into the software systems sold with GC instruments since the 1960s because of the bias towards using peak area—even though "several" practitioners in fact reported obtaining "a better precision from peak height measurements than peak areas." Ex. L, at 673 (citations omitted). The consequence was that the influence of "peak height measurements" as an alternative metric suffered because of the "lack of suitable equipment or computer software for its automatic determination during an analysis" for many years. *Id.* Dr. Lyter testified that in his experience, much like the practitioners who reported preferring peak height measurements, he

precisely the amount of the chemical being studied (although not always)—***not*** that peak area is the only way to determine the concentration of a target chemical from a chromatogram.

But the fact is that ***precise*** quantification of the amount of PE in unheated and heated ink samples is neither necessary for the Solvent Loss Ratio test, nor is it the goal of the analysis. What drives the methodology is how much the PE decreases in an ink sample once it is artificially aged (via heating) ***relative to*** the level of PE in ink extracted from the same entry at the same time that is left untreated. In other words, it does not matter whether the PE levels in either sample, heated or unheated, have been calculated correct to the nearest decimal place—all that matters is whether the loss in concentration of the solvent PE, however roughly that concentration was estimated for both samples, can be measured to exceed a (conservative) threshold of 35%. And because the exact concentration of PE one begins with has never been material to the Solvent Loss Ratio method—only the ***ratio*** of PE between two ink samples after one has been aged—the government's relentless focus at the *Daubert* hearing on whether peak area or peak height is a more-accurate metric was an unhelpful sideshow. (Indeed, it is little wonder that, as Dr. Lyter explained, not one of the seminal papers on the Solvent Loss Ratio method has ever focused on ***how*** PE concentrations are calculated for purposes of the test. *See* Ex. B (Tr. 2961:21–2962:5). The dispute over peak area versus peak height does not remotely constitute a basis under the *Daubert* factors for excluding Dr. Lyter's expert analysis.

For much the same reason, the government's denigration of Dr. Lyter for "eye-balling" the abundance values from the mass spectrums, Ex. B (Tr. 2968:16-2969:14), gets it nowhere. First, "eye-balling" is just a pejorative term for something that mathematicians and scientists

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has obtained better results in the Solvent Loss Ratio method by using peak heights from a mass spectrum. *See* Ex. B (Tr. 3078:5-20).

have been doing with graphs since time immemorial: drawing a horizontal line from a given point on a curve (or bar) to the y-axis to see what value it intercepts at. A computer printout is not necessary to accomplish such a task. Second, even if a computer-generated number (for peak area or peak height) were more accurate, the magnitude of abundance numbers on the y-axis that Dr. Lyter was dealing with—in the ***thousands*** or ***tens of thousands***—made any such greater precision totally superfluous for purposes of calculating the ratio. As he testified, any variation in reading the exact intercept value off the y-axis would be a rounding error in the context of the very large readings at issue, and would not affect the calculation of the R% value to any material degree. Ex. B (Tr. 3028:1-5).[11]

B. Results that Included High Negative R% Values

Mr. LaPorte also faulted Dr. Lyter's analysis because of the magnitude of some negative R% values obtained, stating that he had "never seen" such "high negative R values," which suggests that "there's a quality control issue." Ex. B (Tr. 2981:11-22). As an initial matter, although the government tried to get Mr. LaPorte to say that "[i]t's impossible to have a negative number if [the methodology] is done correctly," Mr. LaPorte refused to make any such blanket assertion, explaining instead: "You can have small deviations and get small negative numbers because of the inherent experimental error in variation in the instrument." Ex. B (Tr. 2981:25-2982:2).

More importantly, whether Mr. LaPorte has ever personally seen high negative R% values—which is as far as his testimony went—is of no moment. (Indeed, it is as irrelevant as Mr. LaPorte's earlier statement that he personally does not know whether Dr. Lyter has testified

[11] For similar reasons, running the GC/MS instrument in the more sensitive SIM mode was not necessary to obtain results because the PE was already at a magnitude where it was being picked up by detectors (and greater sensitivity was not needed to amplify its signal or get a more precise reading down to the unit).

in court regarding the Solvent Loss Ratio methodology, *see* KIT Ex. 10005 at 9—a claim proven false by publicly available judicial records.) The reality is that—as other well-regarded researchers in the field have reported—high negative R% values can be obtained as an artifact of the Solvent Loss Ratio methodology and are generally accepted as a variation in testing. In a forthcoming article in the peer-reviewed journal *Science & Justice*, for example, Agnes Koenig and Celine Weyerman reported several negative R% values ranging up to "***around -50%***," which they attributed to "a high measurement variability mainly due to ink homogeneity and small 2-PE quantities." *See* KIT Ex. 4643 at 14-15 & Figure 6 (reporting twenty negative R% values ranging from approximately -5% to -52%). Nonetheless, despite obtaining several negative R% values in the very range Dr. Lyter calculated, Koenig and Weyerman ***did not once state*** that the magnitude of negative R% values might suggest a quality-control or reliability issue affecting their calculation of solvent loss ratios for PE in ink samples. *See generally id.* For good reason too: Negative R% values indicate no such thing, and there is no evidence in the record other than Mr. LaPorte's unsupported testimony to the contrary.

C. Levels of PE Too Low to Perform Accurate GC/MS Testing.

Mr. LaPorte also aired the concern—which appears to have been abandoned at the *Daubert* hearing too—that "the levels of PE in the GC/MS outputs as set forth in the Anticipated Lyter Testimony varied significantly, and is [sic] some cases, were extremely low," which "can result in significant error." KIT Ex. 10005 at 11. Again, Mr. LaPorte's criticism is belied by the undisputed record. The GC/MS outputs for the test results Dr. Lyter would be testifying about clearly show the level of PE in unheated samples—that is, as the ink was found on paper before it was treated in a laboratory—and, in each instance, the initial level of PE in the unheated sample was of sufficient magnitude for the Solvent Loss Ratio method to be performed correctly. In KIT Ex. 4631, the initial PE level in the ink sample exceeded 50,000 (the y-axis reading

corresponding to the peak at 5.436 minutes on the chromatogram, *see* p. 3). In KIT Ex. 4630, the initial PE level in the ink sample approached 150,000 (the y-axis reading corresponding to the peak at 5.445 minutes on the chromatogram, *see* p. 3). Indeed, Mr. LaPorte appropriately used the Solvent Loss Ratio method in the Facebook case to reliably draw conclusions about the date of ink entries based on an initial PE level of only 20,000, which is far lower than the initial PE levels observed here by Dr. Lyter. *See* KIT Ex. 10006. In the Facebook case, Mr. LaPorte expressed the opinion that only PE levels of 5,000 or less are too low to conduct the Solvent Loss Ratio analysis. But none of the samples Dr. Lyter will testify about—and, in particular, not one of the samples from Government Exhibits had initial PE levels below 5,000. Even under Mr. LaPorte's application of the methodology, they pass muster.

Notably, Mr. LaPorte abandoned three of the criticisms he advanced in his Declaration because these criticisms were contradicted by the record of materials produced to the government: (1) that there was no Autotune of the GC/MS machine prior to testing,[12] (2) that Dr.

[12] Mr. LaPorte initially claimed that Dr. Lyter failed to auto-tune the GC/MS machine prior to testing. *See* KIT Ex. 10005 at 7. That allegation was false (as the government well knew before it resubmitted Mr. LaPorte's declaration, without alteration, as a form of rebuttal expert disclosure). Defense counsel informed the government the GC/MS instrument was auto-tuned before each battery of tests Dr. Lyter conducted. Indeed, the results of such auto tunes were provided on November 10, 2017. Accordingly, Dr. Lyter's report makes clear that the machine he used "has an auto tune function for quality control, which [he] activated before performing any of my tests on the ink samples." KIT Ex. 10004 at 7. Mr. LaPorte did not repeat this criticism while testifying at the hearing.

Lyter failed to use heated and unheated ink samples,[13] and (3) that Dr. Lyter failed to use an internal standard.[14]

* * *

The government's remaining criticisms at the *Daubert* hearing have no bearing on the admissibility of Dr. Lyter's testimony. The government mischaracterized Dr. Lyter's report as having stated he relied on one article—and one article alone—to develop his protocol for conducting the Solvent Loss Ratio method. Tr. 2898 ("The only paper that you say you've relied on is this one from 2002, right, in your report that you signed like three days ago?"); Tr. 2900 ("This is the only one you relied on, correct?"). In fact, Dr. Lyter's report says no such thing. What the report ***does*** say is:

> There are ***several reported examination methodologies*** for the measurement of PE in ink samples taken from documents and the subsequent comparison of these measurements with other samples of ink taken at the same time, but exposed to artificial aging conditions prior to measurement.
>
> ***One such report by Gaudreau and Brazeau***, which sets forth a methodology generally accepted in the field as a means of ink-dating, explains that when an ink sample was exposed to artificial aging conditions (70º C for 120 minutes) and compared

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[13] Mr. LaPorte also initially opined that Dr. Lyter failed to use heated and unheated ink samples when conducting his GC/MS tests. *See* KIT Ex. 10005 at 7). That allegation was false, too (as the government also knew when resubmitting LaPorte's declaration without alteration). Defense counsel informed the government on August 29, 2017, that Dr. Lyter followed the methodology established in the Gaudreau article—a methodology that plainly involves the use of heated and unheated samples. Indeed, it is difficult to imagine how anyone could reliably perform an ink-dating test without the use of heat as an artificial-aging mechanism (and the suggestion that Dr. Lyter would have done such a half-baked test is nonsensical). Thus, for good reason, Mr. LaPorte dropped any suggestion at the *Daubert* hearing that ink samples from the notebooks were not heated for purposes of a comparative test with unheated samples

[14] Mr. LaPorte also alleged that Dr. Lyter failed to use an internal standard chemical to quantitate the level of PE measured when conducting his GC/MS tests. *See* KIT Ex. 10005 at 7. Again, that claim was false (as the government knew full well before it resubmitted LaPorte's declaration, without change, to the Court on November 7, 2017, as a sort of rebuttal disclosure). Defense counsel informed the government on August 29, 2017, that Dr. Lyter followed the methodology established in the Gaudreau article—a methodology that plainly involves the use of internal standard.

> with a neat, unheated sample of ink—after extraction of both samples with an Internal Standard chemical—the difference in the levels of PE present (and measured) allows for a determination of the approximate preparation date or time period.

KIT Ex. 10004 at 6. The government's badgering on a point belied by the written record resulted in a string of confused exchanges at hearing before Dr. Lyter finally was able to clarify that he relied "[a]s well [on] the additional articles that are in the literature now that have referenced this and taken it a step further." Tr. 2900.

With respect to whether there was attorney direction of which handwritten entries to sample, Dr. Lyter testified squarely on direct examination that a Gibson Dunn lawyer "would identify pages or groups of pages [from the notebooks] that were, I guess, of interest; but as to how much examination or whether any samples were taken from those pages was done at my discretion." Tr. 2822. He did not hide the fact that "there was input" from Mr. Isaza Tuzman's attorneys. Although the government made much of the fact that his report said otherwise, Dr. Lyter candidly agreed on redirect that the characterization of sampling in his report may have been an overstatement because, as he ***reiterated***, "[t]here was at least input from [an attorney] at the initial stages of which documents would be examined." Tr. 3018. But Dr. Lyter reaffirmed that "the actual samples that were taken were taken from documents at [his] discretion" based on his knowledge of the case because there were many samples taken for the purpose of PE analysis that "weren't examined because of time constraints" and no Gibson Dunn attorney traveled to North Carolina, where he did the chemical examinations. Tr. 3018-19; *see also* Tr. 2951-52. Moreover, there was no showing that attorney input into sampling has any impact on the reliability of the ink analysis Dr. Lyter conducted. Because, of course, it does not: Random versus guided selection has no bearing on whether an R% value derived from GC/MS analysis will come back above a certain threshold.

CONCLUSION

For the foregoing reasons, the Court should overrule the government's objections to Dr. Lyter's proffered opinions and permit the jury to evaluate the weight of his expert testimony.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on November 28, 2017, I caused a true and correct copy of the foregoing to be served by electronic means, via the Court's CM/ECF system, on all counsel registered to receive electronic notices.

/s/ Avi Weitzman
Avi Weitzman